Single Aisle
TECHNICAL TRAINING MANUAL
T1+T2 (IAE V2500) (Lvl 2&3)
INFORMATION SYSTEMS

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INFORMATION SYSTEMS

AIR TRAFFIC & INFO MANAGEMENT SYS (ATIMS)

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UGB13131 - U7ST0M0

ATIMS DESCRIPTION/OPERATION (3)

ATSU

The Air Traffic Service Unit (ATSU) has been designed to take provision of all foreseen evolutions. The modularity concept for the software (S/W) makes easy data link capability during all Communication Navigation Surveillance and Air Traffic Management (CNS/ATM) transitions. The ATSU S/W is partitioned into two main parts:
- aircraft interface/host platform and,
- data link applications.

AIRCRAFT INTERFACE/HOST PLATFORM SOFTWARE

The aircraft interface/host platform S/W is composed of four services:
- air/ground communication, used for the management of the air/ground communication media,
- Human-Machine Interface (HMI), used for the management of the CNS/ATM cockpit interfaces: MCDU, printer and alert function,
- on-board peripherals, used for the management of the communication with the on-board peripheral units: Data Management Unit (DMU) part of the Flight Data Interface and Management Unit (FDIMU), Centralized Fault Display Interface Unit (CFDIU), Flight Management System (FMS) and cabin terminal,
- system management, used for the acquisition of the aircraft parameters for application S/W use and monitoring of the system: power supply and BITE functions.

DATA LINK APPLICATION

The data link applications include only Airline Operational Control (AOC) for the pre-Future Air Navigation System (FANS) configuration. The AOC applications are dedicated to data communication services between the aircraft and the airline facility.
The AOC is composed of:
- remote AOC applications and,
- hosted AOC applications.

For the remote AOC applications, the ATSU only routes data to and from AOC peripherals. This routing is in charge of receiving ground messages and routing them to the right AOC peripheral and acquiring messages or reports from these peripherals and sending them to the ground. The hosted applications depend on airline definition and uploaded into the ATSU. These applications include standard and customized functions. The main functions are:
- AOC menu display,
- processing, printing and display of received messages,
- generation, triggering and sending of messages.

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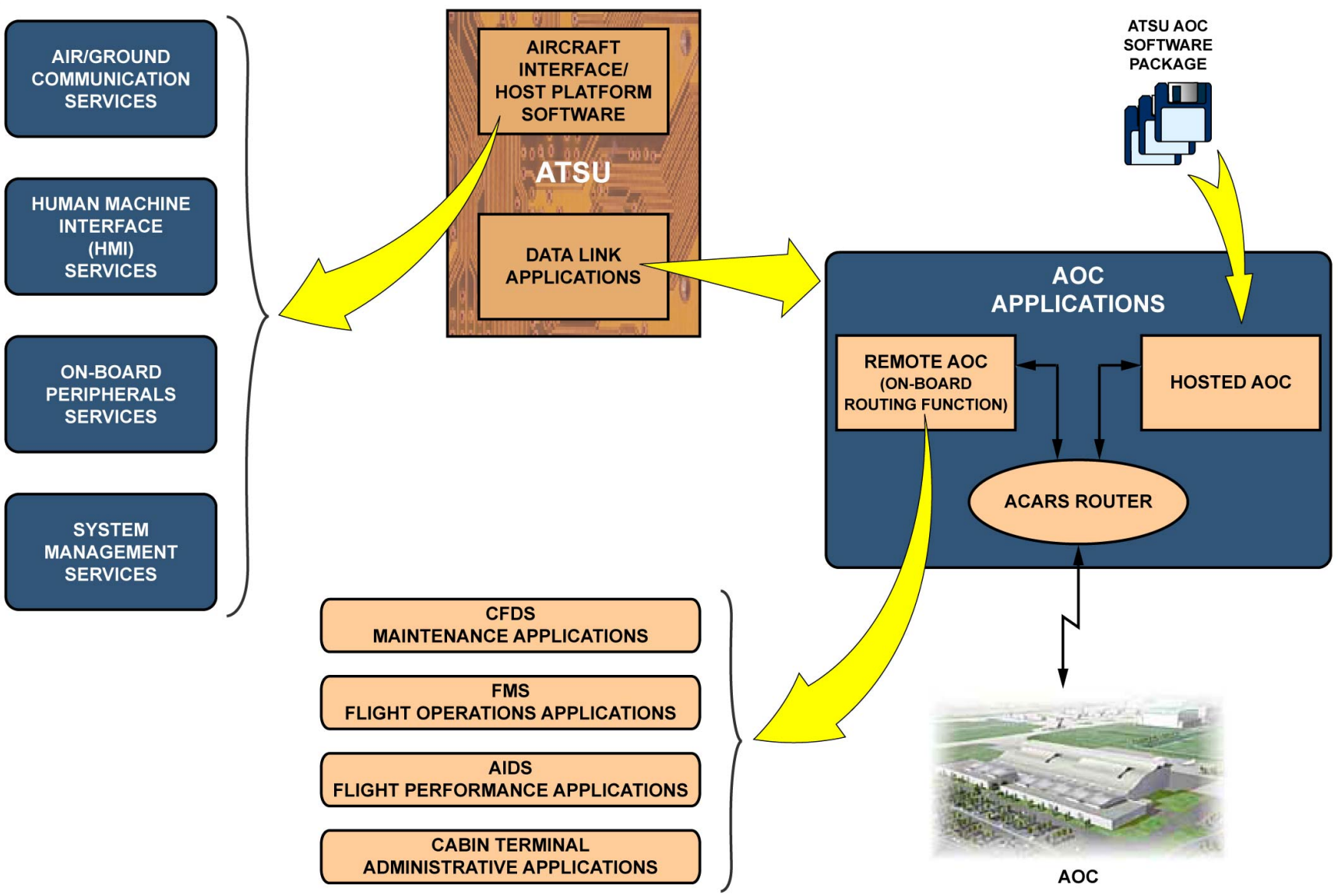

ATSU - AIRCRAFT INTERFACE/HOST PLATFORM SOFTWARE & DATA LINK APPLICATION

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ATIMS DESCRIPTION/OPERATION (3)

ATSU SOFTWARE LOADING

The ATSU S/W is uploaded via the Multipurpose Disk Drive Unit (MDDU). If a complete S/W uploading is required, a de-selection of the ATSU data loading must be carried out, for each type of S/W, so that a re-initialization of the ATSU can be made until the DATALINK ATSU FAULT warning goes off on the EWD.

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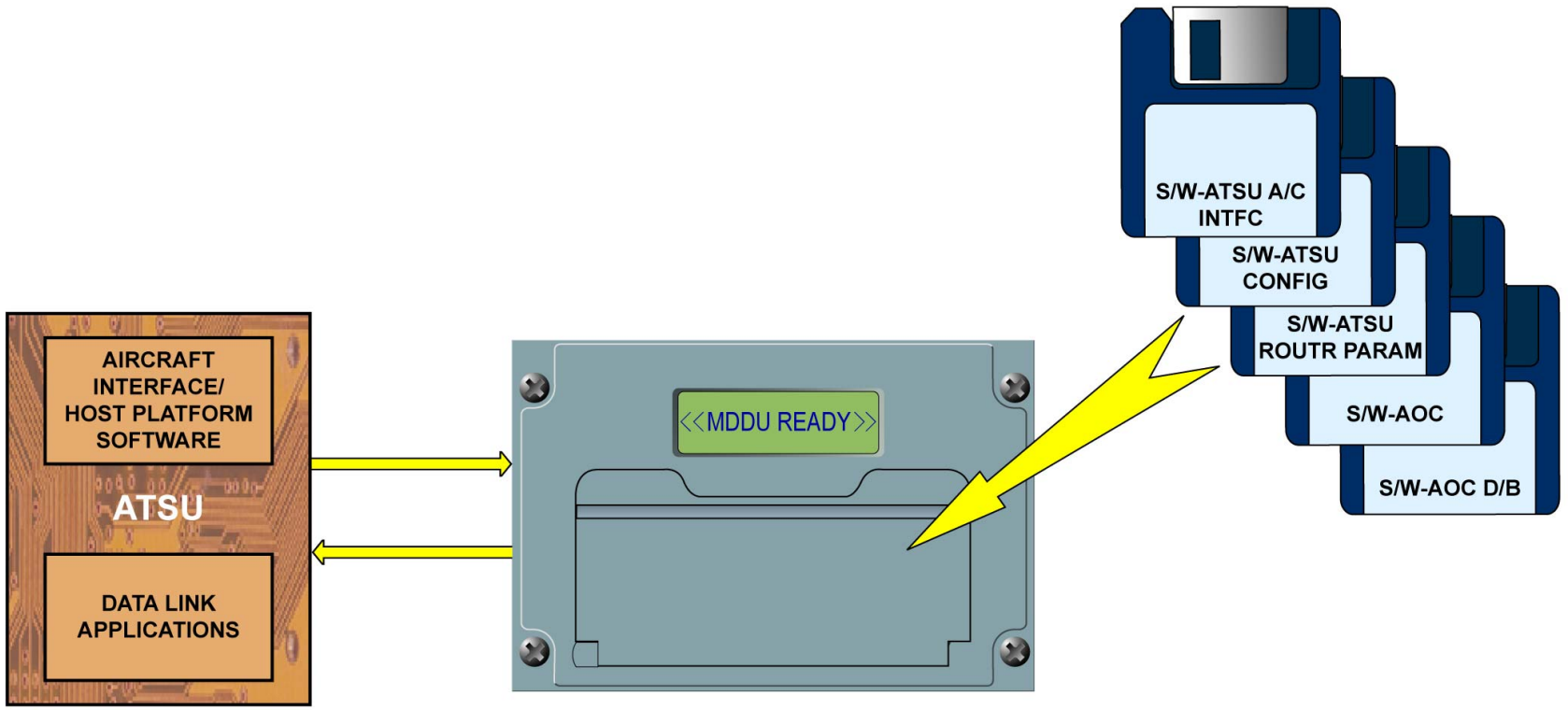

ATSU SOFTWARE LOADING

ATIMS WARNINGS (3)

DATALINK ATSU FAULT

When there is an Air Traffic Service Unit (ATSU) failure, the message "DATALINK ATSU FAULT" appears on the EWD, in this case, MASTER CAUTion light and Single Chime (SC) will be activated, and no SD page is called.

NOTE: In the INOP SYS column of the STATUS page, the ATSU fault message appears.

ATSU STBY

When the data link function is lost or unavailable or when there is an ATSU router configuration failure, the left memo "COMPANY DATALINK STBY" appears in green.

NOTE: "ATSU installed" pin programming is activated on the FWC.

ATSU MSG

When an Airline Operational Control (AOC) message is received, the right memo "COMPANY MSG" appears in green.

NOTE: The right memo COMPANY ALERT is displayed with a continuous buzzer sound, when the crew receives a high importance message from the company.

ATSU CALL

When a call request message is received, the right memo "COMPANY CALL" appears in green.

VHF3 VOICE

When VHF Data Radio (VDR) 3, configured in VHF DataLink (VDL) mode 2, is not available for data transmission, the right memo "VHF3 VOICE" appears in green.

NOTE: VDR is capable VDL mode 2 when "ATSU installed" pin programming is activated on the FWC.
The VDL mode 2 function is used to reduce channel saturation. With this function, the rate throughput is increased ten times through a D8-PSK modulation (31,5 Kbit/s).

HF VOICE

When all the HF Data Radio (HFDR) (if installed) are in voice mode, the right memo "HF VOICE" pulses in green for 10 seconds and then stays stable.

NOTE: HFDR1 with VDL mode 2 function for datalink is optional.

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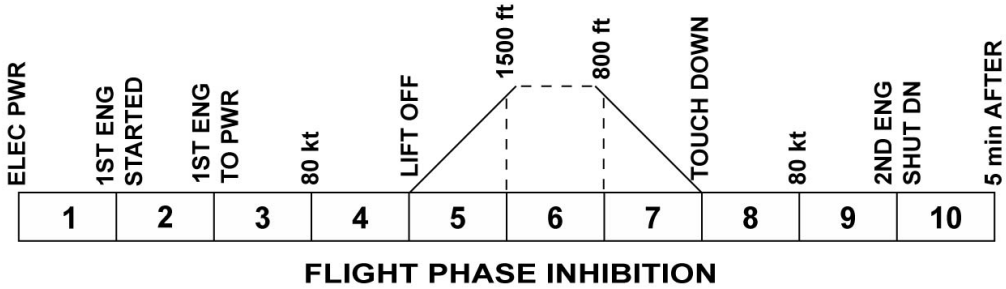

FLIGHT PHASE INHIBITION

E/WD : FAILURE TITLE	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLIGHT PHASE INHIB
DATALINK ATSU FAULT	SINGLE CHIME	MASTER CAUT	NIL	NIL	3, 4, 5, 7, 8
COMPANY STBY	NIL	NIL	NIL	NIL	3, 4, 5, 7, 8
COMPANY MSG					
COMPANY CALL					
VHF3 VOICE					
HF VOICE					

DATALINK ATSU FAULT ... HF VOICE

ATIMS MCDU MENUS DESCRIPTION (2)

GENERAL

The MCDU gives the following functions:
- Airline Operational Control (AOC) hosted applications and,
- air-ground communication management.

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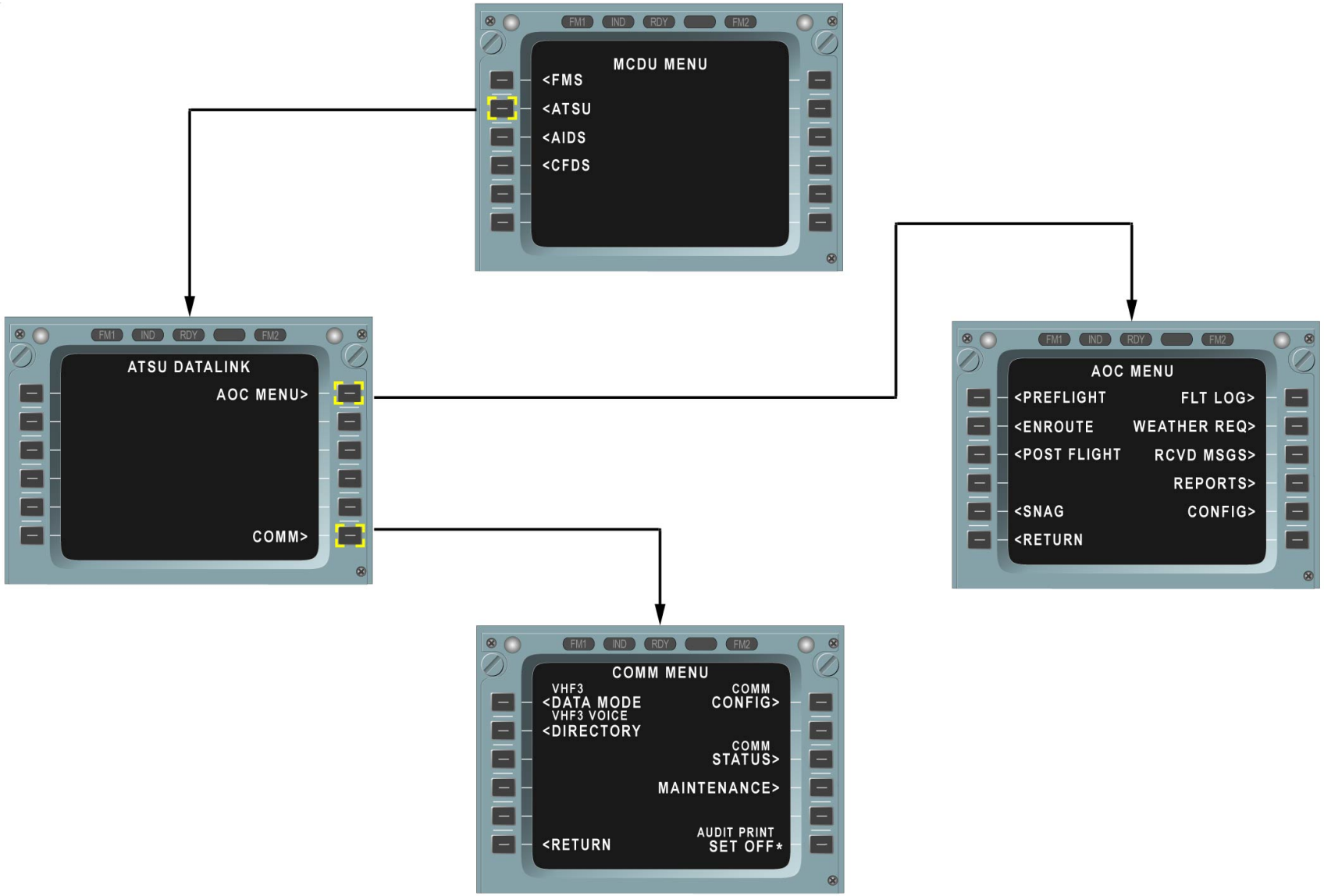
FM1
IND
RDY
FM2
MCDU MENU
<FMS
<ATSU
<AIDS
<CFDS
ATSU DATALINK
AOC MENU>
COMM>
AOC MENU
<PREFLIGHT
FLT LOG>
<ENROUTE
WEATHER REQ>
<POST FLIGHT
RCVD MSGS>
REPORTS>
<SNAG
CONFIG>
<RETURN
COMM MENU
VHF3
<DATA MODE
VHF3 VOICE
<DIRECTORY
COMM
CONFIG>
COMM
STATUS>
MAINTENANCE>
<RETURN
AUDIT PRINT
SET OFF*

GENERAL

ATIMS MCDU MENUS DESCRIPTION (2)

COMM MENU

The air-ground communications functions and services are active as soon as their initialization is complete.

NOTE: The AUDIT PRINT PAGE SET OFF function is used to disable this function directly from this page without having to get access to the AUDIT page.

COMM CONFIG

The initialization through COMM CONFIG menu is considered as completed when the Air Traffic Service Unit (ATSU) has received a valid aircraft registration number, airline identification and scan mask. The aircraft registration number and airline identification are used in the air/ground communication as aircraft addressing means. The VHF3 SCAN SEL gives an ordered list of authorized service providers usable for data communications.

VHF3 DATA MODE

The VHF3 DATA MODE page shows the various regions, which can be selected. Each region is associated with a data link service provider and a frequency.

VHF3 VOICE DIRECTORY

The VHF3 VOICE DIRECTORY page fulfills the following functions:
- display a voice frequency directory,
- activate one of these frequencies,
- select the data mode,
- activate the voice frequency contained in the last received CO CALL message,
- manually enter a frequency.

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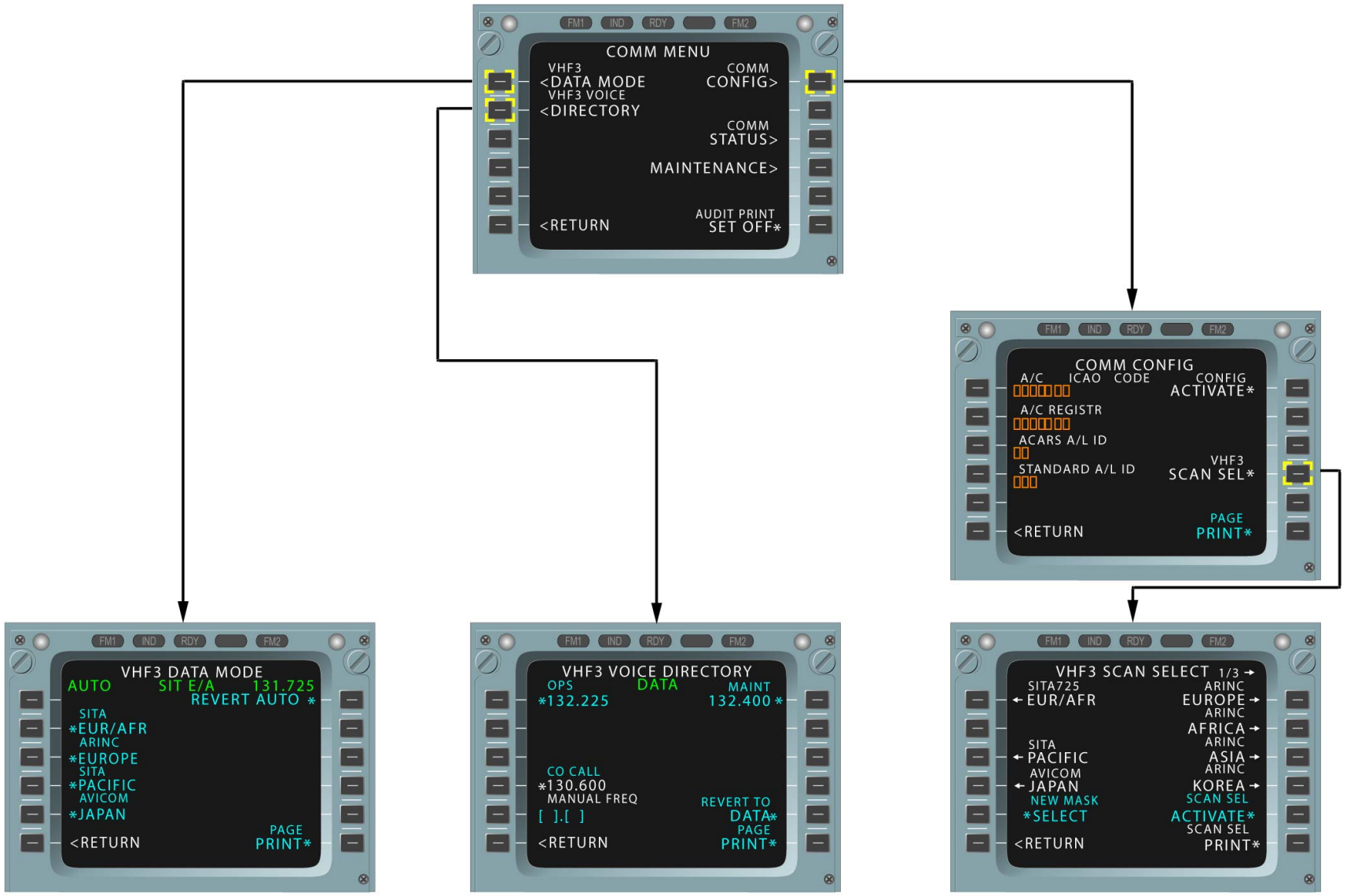

COMM MENU - COMM CONFIG ... VHF3 VOICE DIRECTORY

ATIMS MCDU MENUS DESCRIPTION (2)

COMM MENU (continued)

COMM STATUS

The COMM STATUS pages are used to verify the communication status of ATSU:
- the air/ground communication media status; VHF3, SATCOM (if installed) and HF 1 only (if HFDR installed),
- the communication (router) status of the on-board peripherals.

MAINTENANCE STATUS

The MAINTENANCE menu is composed of three functions:
- TEST, which is used to test the link between the communication media (VHF3, SATCOM and HF if installed) and the ground,
- STATISTICS used for media and router statistics: number of up linked messages, number of down linked messages,
- AUDIT to print out exchanged messages per media and router depending on selection.

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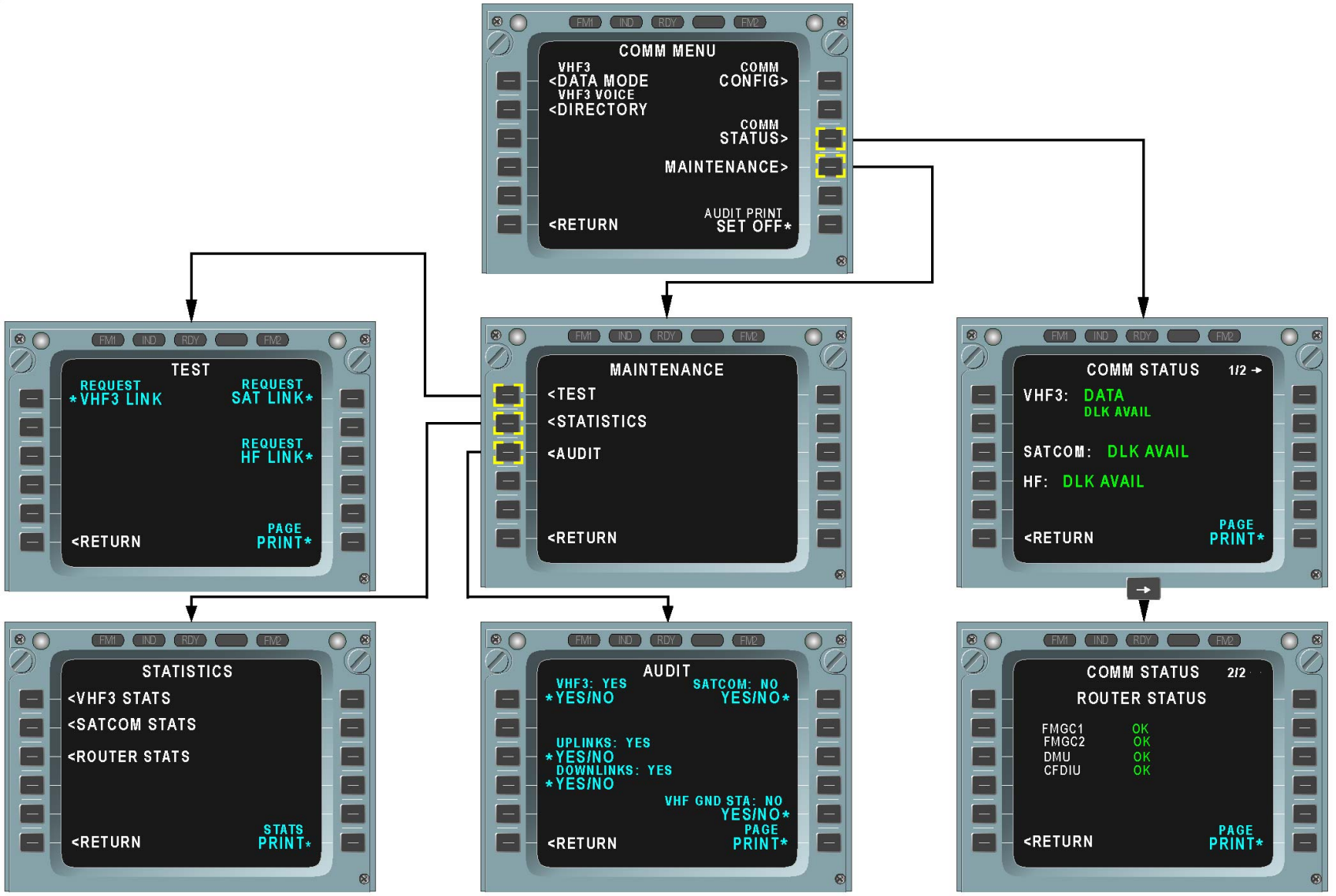

COMM MENU - COMM STATUS & MAINTENANCE STATUS

ATIMS MCDU MENUS DESCRIPTION (2)

AOC MENU

The AOC MENU can be customized and gives access to the hosted AOC applications loaded in the ATSU. The CONFIG function gives access to a SYSTEM CONFIG page to verify that the correct AOC software (S/W) and data base Part Number (PN) have been successfully loaded into the ATSU.

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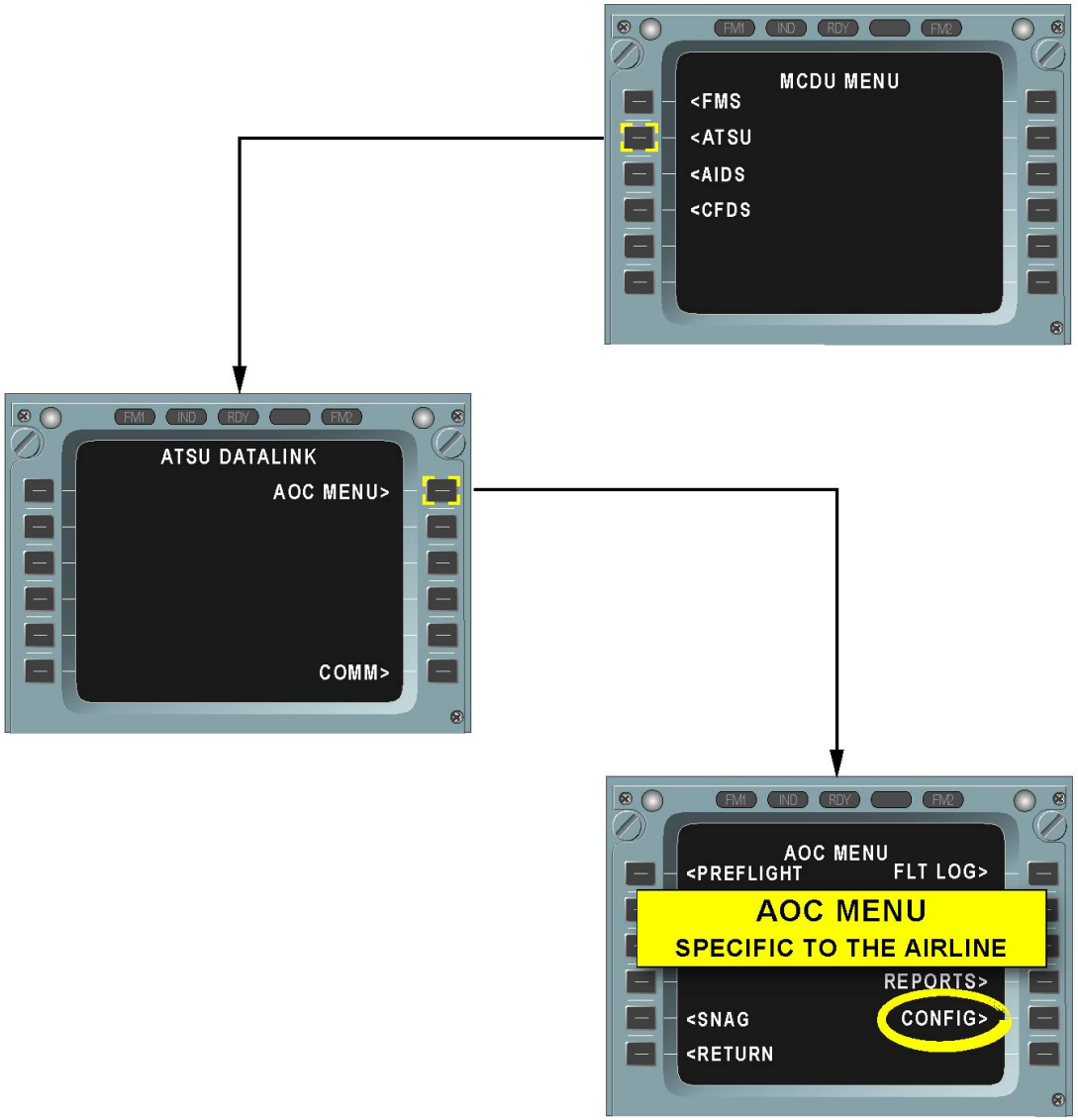
FM1
IND
RDY
FM2
MCDU MENU
<FMS
<ATSU
<AIDS
<CFDS
ATSU DATALINK
AOC MENU>
COMM>
AOC MENU
<PREFLIGHT
FLT LOG>
AOC MENU
SPECIFIC TO THE AIRLINE
REPORTS>
<SNAG
CONFIG>
<RETURN

AOC MENU

ATSU ROUTER INIT & TESTS THROUGH MCDU (2)

INITIALIZATION PROCEDURE OF THE ATSU ROUTER

GENERAL

This procedure, called initialization of the Air Traffic Service Unit (ATSU) router, enables the air-ground communications functions and services of the ATSU to be activated. Four essential parameters are required:
- A/C ICAO CODE (24bit address sent by the ATC Transponders),
- a valid airline identification (ACARS and STANDARD A/L ID),
- a valid A/C registration number (A/C REGISTR) and,
- a valid scan mask.

Otherwise, the DATALINK ATSU FAULT+ ATSU INIT FAULT amber warnings are displayed on the Engine/Warning Display (EWD).

NOTE: According to the pin programming activated on the Flight Warning Computer (FWC) ("ACARS installed" or "ATSU installed"), the ACARS STBY green memo is displayed instead of the DATALINK ATSU FAULT+ATSU INIT FAULT warning.

A/C REGISTRATION NUMBER AND FLIGHT IDENTIFICATION

The A/C registration number is sent by the Centralized Fault Display Interface Unit (CFDIU). The ATSU creates the flight identification by concatenating the airline identification parameter and the flight number parameter coming from the Flight Management and Guidance Computer (FMGC). The airline identification is not available and must be entered.

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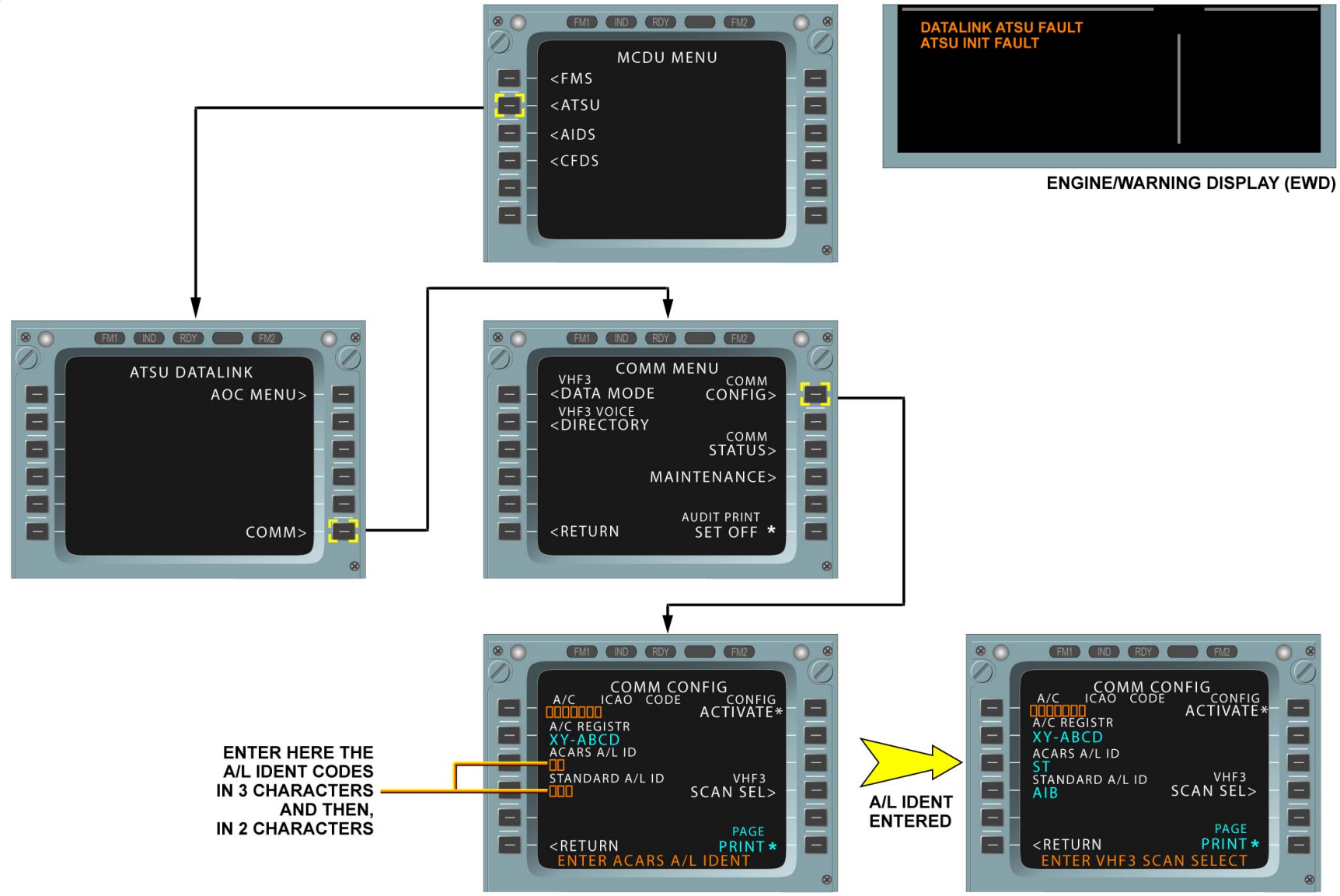


INITIALIZATION PROCEDURE OF THE ATSU ROUTER - GENERAL & A/C REGISTRATION NUMBER AND FLIGHT IDENTIFICATION

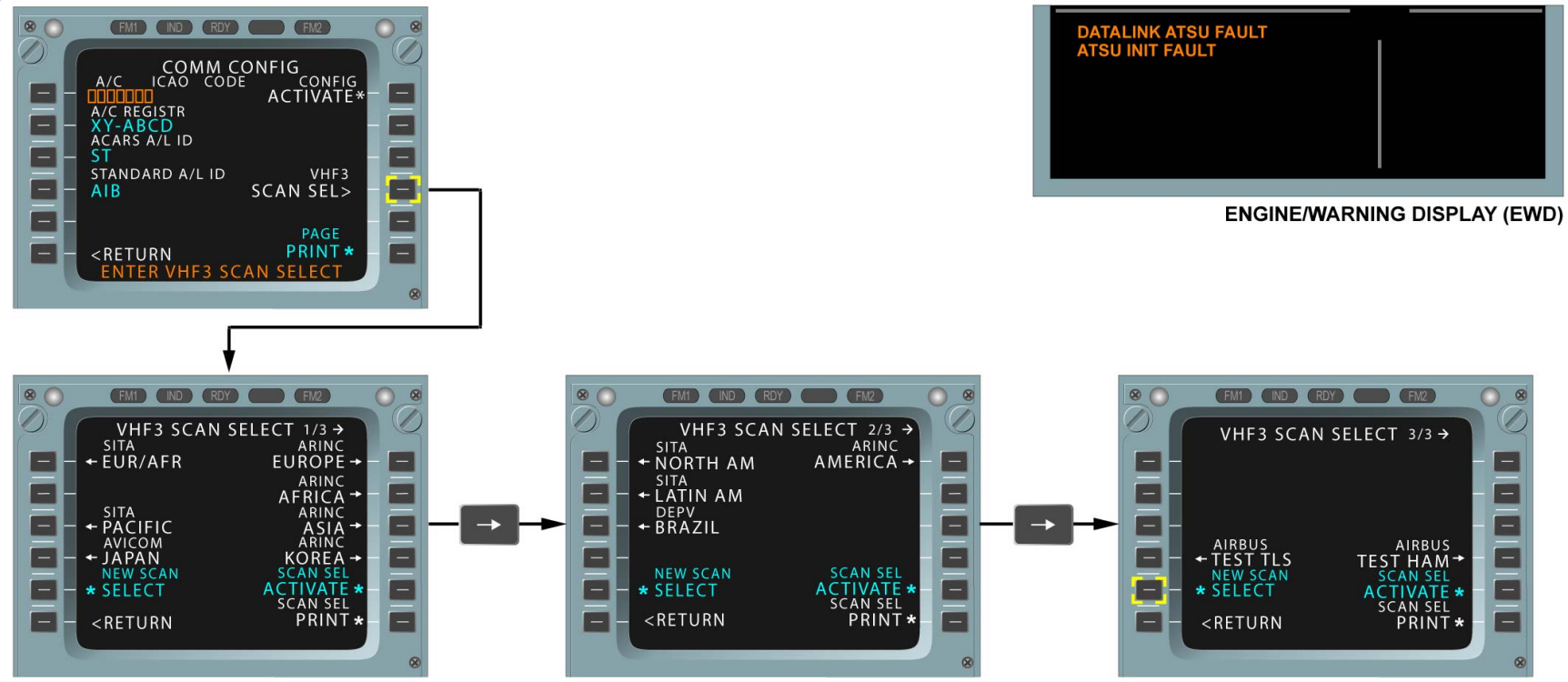
ATSU ROUTER INIT & TESTS THROUGH MCDU (2)

INITIALIZATION PROCEDURE OF THE ATSU ROUTER (continued)

SCAN MASK VALIDATION

The last parameter required is the scan mask validation. The three VHF SCAN SELECT pages give an ordered list of service providers usable for VHF data communications. TEST TLS and TEST HAM are activated only for test and shall not be selected for airline operations. The NEW SCAN SELECT function is used to erase the previous selection. The VHF3 SCAN MASK is compulsory for the router operation.

UGB13131 - U7ST0M0 - UM46Y1000000001



INITIALIZATION PROCEDURE OF THE ATSU ROUTER - SCAN MASK VALIDATION

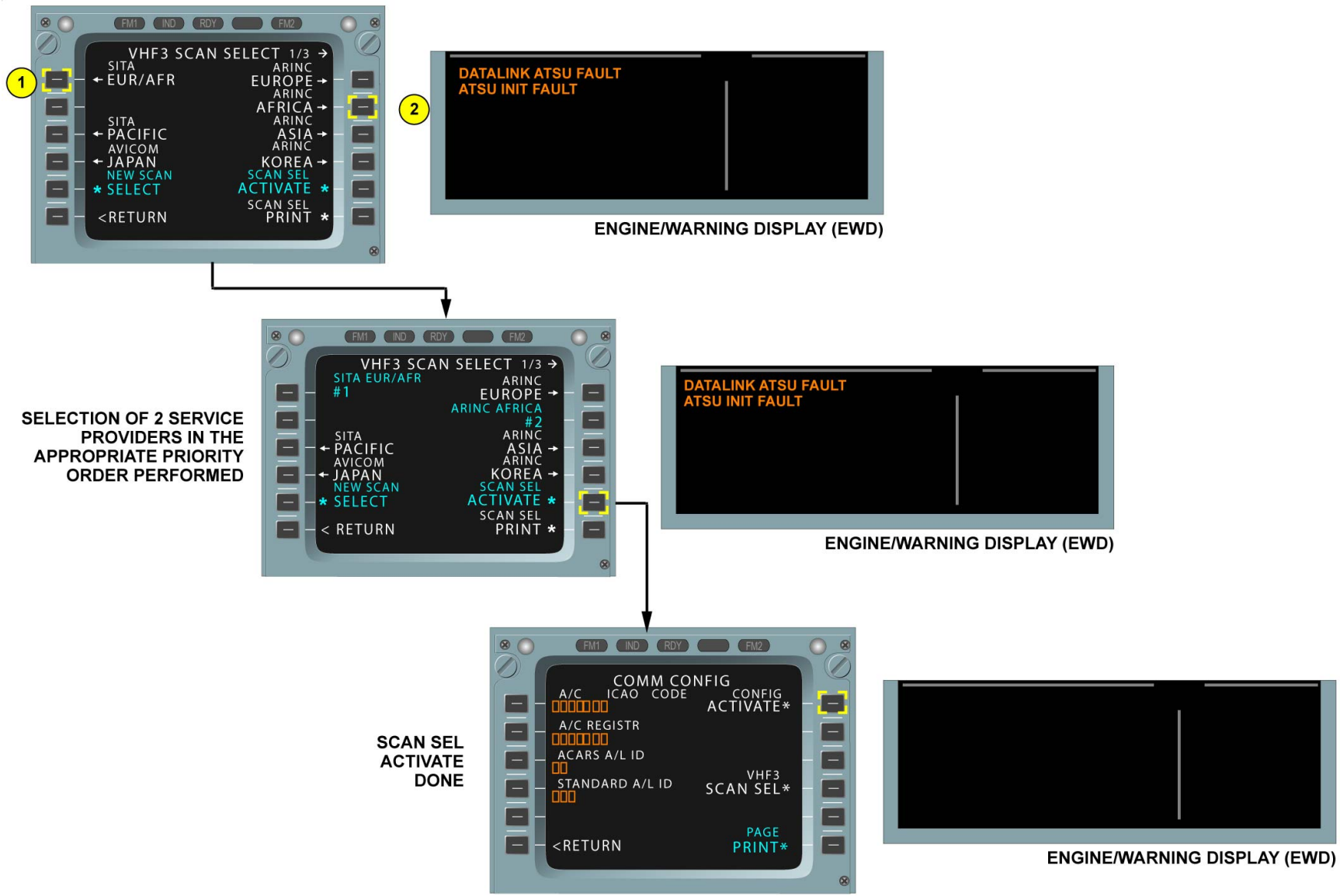
ATSU ROUTER INIT & TESTS THROUGH MCDU (2)

INITIALIZATION PROCEDURE OF THE ATSU ROUTER (continued)

SCAN MASK VALIDATION (CON'T)

The scan mask must be a prioritized list of VHF service providers contracted by the airline. Select one or more service providers in the appropriate priority order to compose the scan mask. SITA EUR/AFR and ARINC AFRICA are selected as an example. The SCAN SEL ACTIVATE allows the new selection to be loaded into the ATSU. To finalize the initialization the CONFIG ACTIVATE LSK in the COMM CONFIG menu must be pressed. When the initialization of the ATSU router is completed, the DATALINK ATSU FAULT + ATSU INIT FAULT warning goes off.

UGB13131 - U7ST0M0 - UM46Y1000000001



INITIALIZATION PROCEDURE OF THE ATSU ROUTER - SCAN MASK VALIDATION (CON'T)

ATSU ROUTER INIT & TESTS THROUGH MCDU (2)

INITIALIZATION PROCEDURE OF THE ATSU ROUTER (continued)

VHF3 DATA MODE PAGE

A last check in the VHF3 DATA MODE page is required. The VHF3 DATA MODE page displays the data link service providers selected in the VHF3 SCAN SELECT menu. The initialization of the ATSU router is completed.

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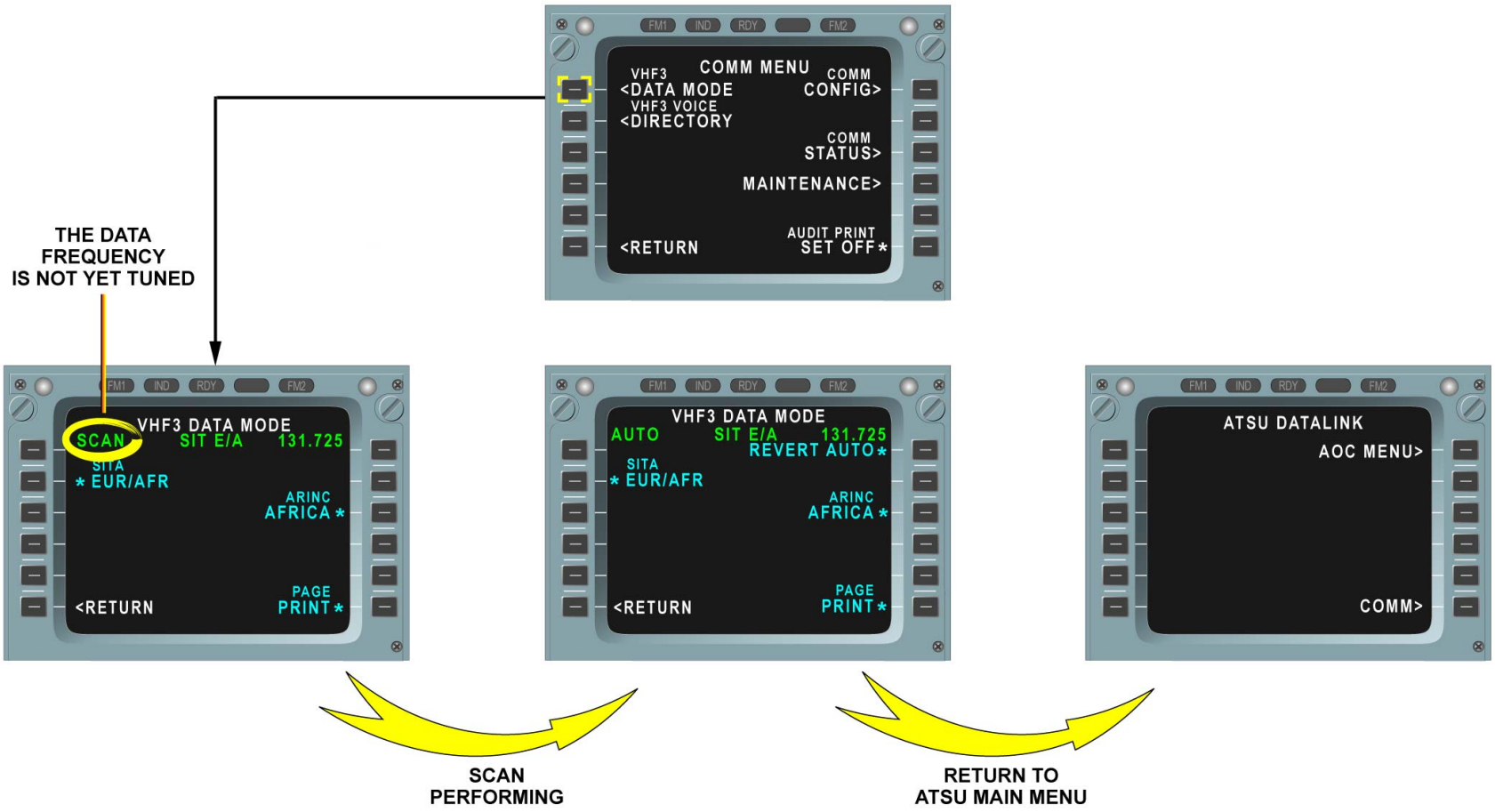

INITIALIZATION PROCEDURE OF THE ATSU ROUTER - VHF3 DATA MODE PAGE

ATSU ROUTER INIT & TESTS THROUGH MCDU (2)

OPERATIONAL TEST

VOICE MODE TEST

This procedure, called operational test of the ATSU, serves to check the ATSU router configuration and test the voice mode. The initialization of the ATSU router is completed. The ATSU automatically controls data frequencies in the order defined in the VHF3 SCAN SELECT menu, but a service provider can be manually selected. The VHF3 VOICE DIRECTORY page serves:
- to activate one of the displayed frequencies configured by the Airline Operational Control (AOC) application,
- to activate the voice frequency requested by the ground (CO CALL),
- to manually enter a frequency and,
- to go back to data mode.

When the OPS frequency is activated (132.225 given as an example), the ATSU controls the VHF3 frequency in VOICE mode. On the Radio Management Panel (RMP), the DATA indication stays in view in the active window. In this mode, communication tests with the ground can be done.

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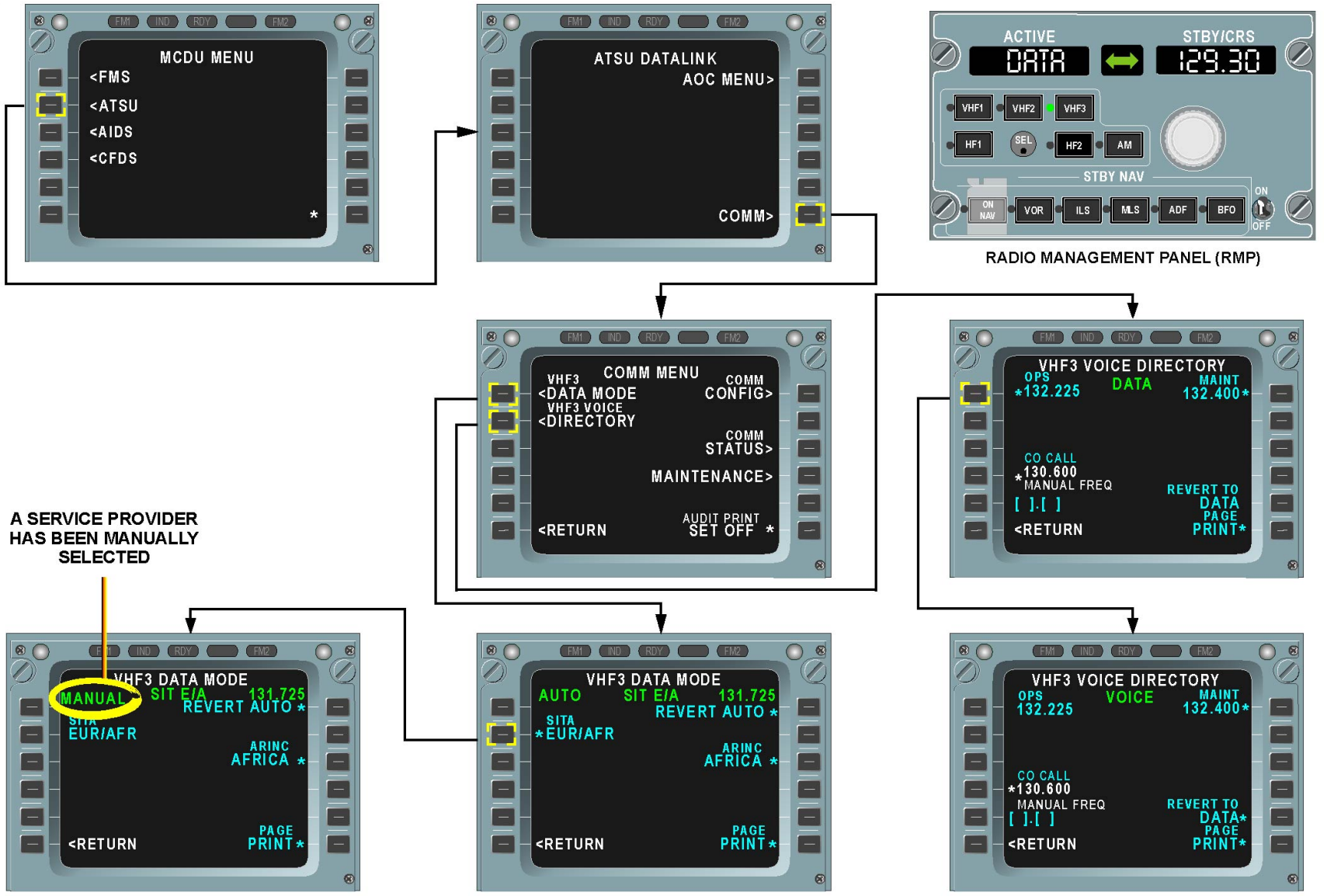


OPERATIONAL TEST - VOICE MODE TEST

UGB13131 - U7ST0M0 - UM46Y1000000001

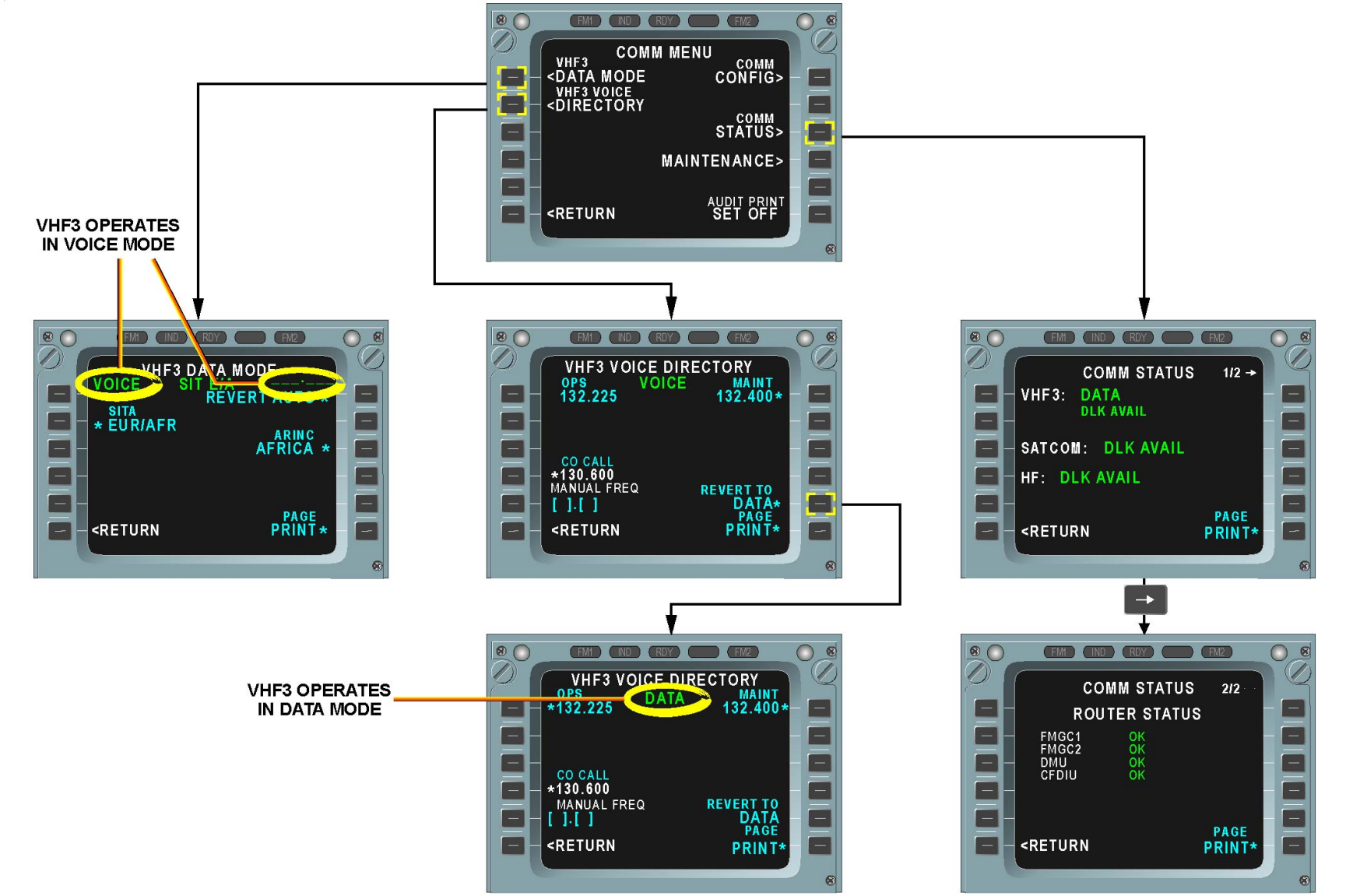
ATSU ROUTER INIT & TESTS THROUGH MCDU (2)

OPERATIONAL TEST (continued)

CONFIGURATION CHECK

The modified configuration through the VHF3 DATA MODE is checked. Then, a come back to the DATA MODE is performed. The COMM STATUS pages are used to verify the communication status of ATSU:
- the air/ground communication media status: VHF3, SATCOM (if installed) and HF (if HFDR installed),
- the communication (router) status of the on-board peripherals.

UGB13131 - U7ST0M0 - UM46Y1000000001



OPERATIONAL TEST - CONFIGURATION CHECK

ATSU ROUTER INIT & TESTS THROUGH MCDU (2)

VHF3 LINK TEST

ATSU INITIALIZATION CHECK

This procedure, called VHF3 link test of the ATSU, checks the VHF3 link between the A/C and the ground. A check of the ATSU initialization is done through the VHF3 DATA MODE menu, the VHF3 VOICE DIRECTORY menu and the COMM STATUS menu. VHF3 must be operational, the VHF3 link available and in DATA mode.

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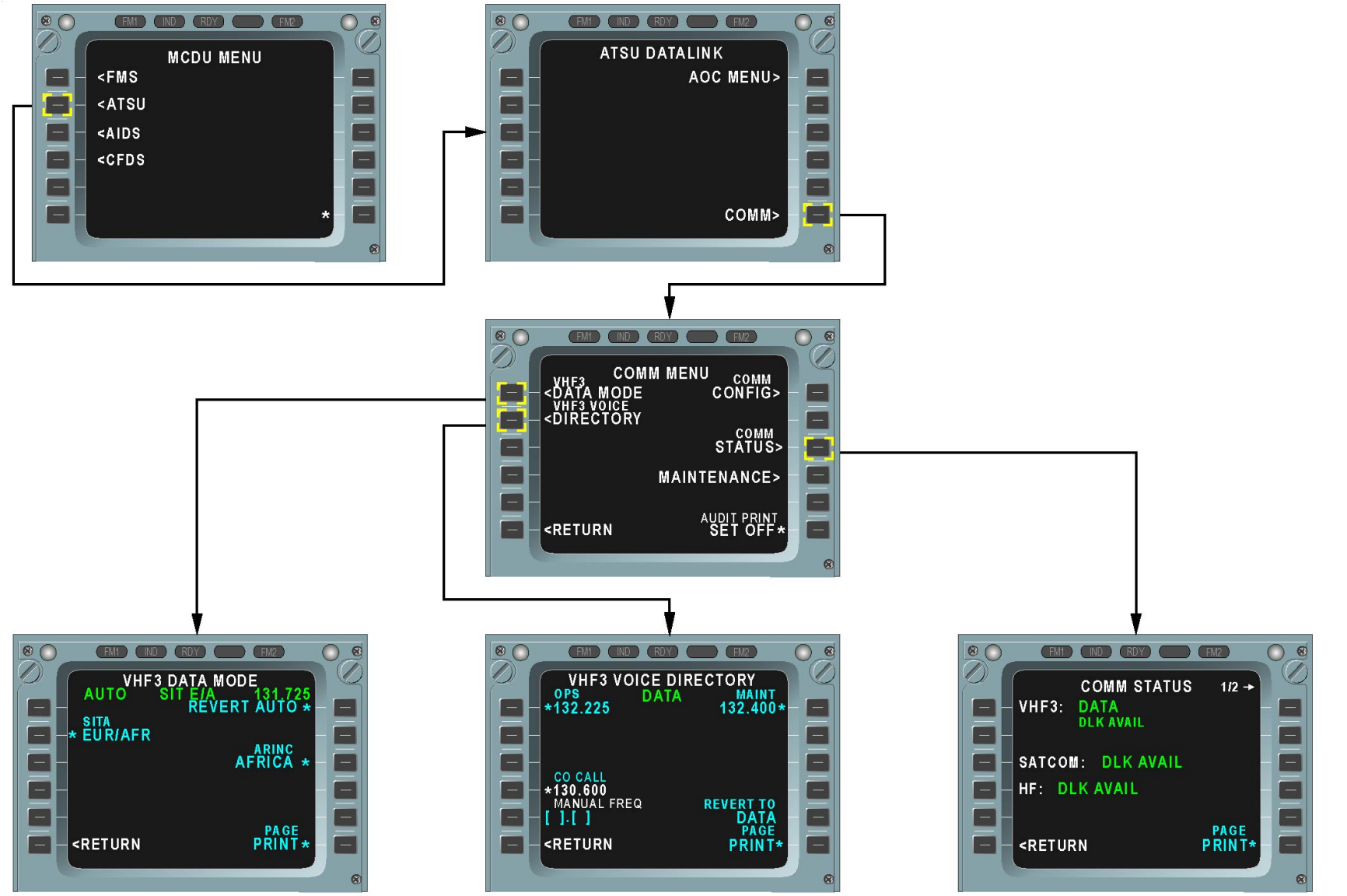


VHF3 LINK TEST - ATSU INITIALIZATION CHECK

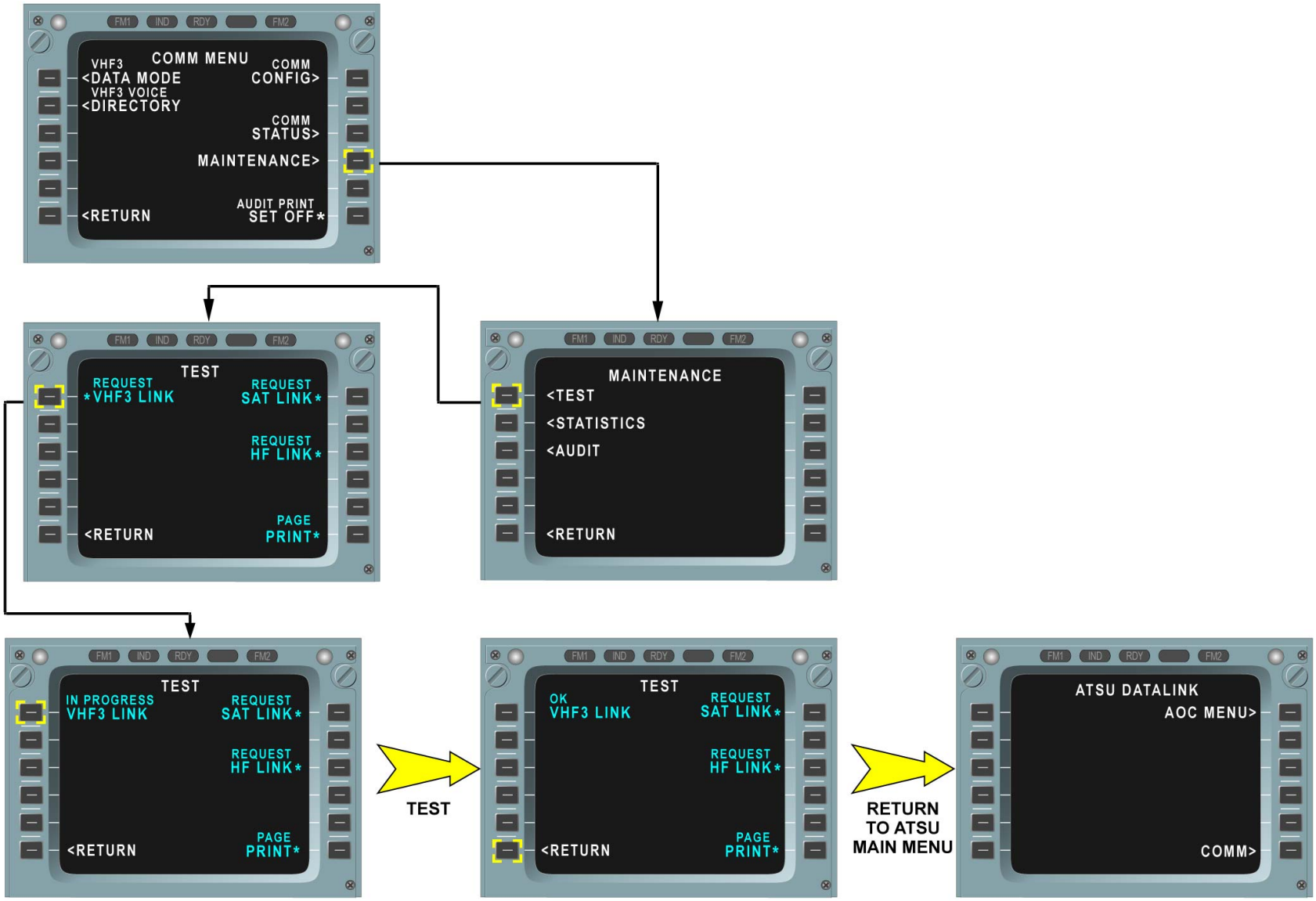
ATSU ROUTER INIT & TESTS THROUGH MCDU (2)

VHF3 LINK TEST (continued)

TEST

The link test is accessible through the MAINTENANCE menu. The result of this test confirms that the communication link between VHF3 and the ground is operational.

UGB13131 - U7ST0M0 - UM46Y1000000001



VHF3 LINK TEST - TEST

ATIMS INTERFACES (3)

AFS/ATIMS INTERFACE

The Air Traffic Service Unit (ATSU) is interfaced with the Flight Management and Guidance Computers (FMGCs) and the MCDUs for Automatic Flight System (AFS).

FMGC

The ATSU sends data to both FMGCs on an ARINC 429 bus and receives data from both FMGCs on another one. The ATSU/FMGCs interface is used for:
- Airline Operational Control (AOC) hosted application for acquisition of operational data: origin/destination airport, flight number, fuel on board,
- remote AOC application to exchange AOC messages,
- air-ground communication functions: flight number, Flight Management System (FMS),
- system management and configuration to exchange data link communication status and configuration between ATSU and FMGCs.

MCDU

The ATSU sends data to MCDUs on an ARINC 429 bus and receives data from MCDUs on another one. The ATSU/MCDUs interface is used for:
- the AOC application to select the AOC mode, parameter entry (captain name, fuel units...), display of AOC specific information (AOC received messages, scratchpad messages...), and print command,
- air-ground communication functions is used to show the router specific information, crew requests for router modes of operation and parameter entry, print command.

COMMUNICATION SYSTEMS/ATIMS INTERFACE

The ATSU is interfaced with the VHF Data Radio (VDR) 3 configured in VHF DataLink (VDL) mode 2, the Satellite Data Unit (SDU), the HF Data Radio (HFDR) 1 (if installed) configured in HF DataLink (HFDL) mode, the ATC Transponders, and the Radio Management Panels (RMPs) for communication system.

VDR3

The ATSU sends and receives data from VDR3 through ARINC 429 links for:
- data block exchanges and,
- status transmission.

The ATSU sends 2 discrete signals to VDR3 to control:
- VDR3 switching between voice and data mode,
- port select for VDR3 frequency selection.

NOTE: VDR is capable VDL mode 2 when "ATSU installed" pin programming is activated on the FWC.
The VDL mode 2 function is used to reduce channel saturation. With this function, the rate throughput is increased ten times through a D8-PSK modulation (31,5 Kbit/s).

SDU1

The ATSU sends and receives data from SDU1 through ARINC 429 links for:
- data block exchanges and,
- status transmission.

NOTE: The ATSU/SDU interface is optional.

HFDR1

The ATSU sends and receives data from HFDR1 through ARINC 429 links for:
- data block exchanges and,
- status transmission.

NOTE: Based on the existing HF system provision or installation, additional wiring provision is installed to make HFDR (optional) capable of datalink mode communication. HF1 (and HF1 only) system will be connected to the following systems: ATSU (only one HFDR connected).

ATC XPDR

The ATSU uses for the VDL2 function the ICAO code (24 bit address) sent by the ATC transponders.
The ICAO code is first extracted from the ATC transponder 1 and then from the ATC transponder 2 if the ATC transponder 1 is not available.

RMP

The ATSU sends 1 discrete signal to the 3 RMPs to indicate which entity is controlling the VDR3. The ATSU receives only 1 discrete signal from the 3 RMPs, which is used to request the mode switching to the ATSU.

INDICATING AND RECORDING SYSTEMS/ATIMS INTERFACE

For the indicating system, the ATSU is interfaced with the Flight Warning Computers (FWCs), the System Data Acquisition Concentrators (SDACs), the Display Management Computers (DMCs), the Multi-Mode Receiver 2 (MMR2) and the clock. For the recording system, the ATSU is interfaced with the Data Management Unit (DMU) part of the Flight Data Interface and Management Unit (FDIMU), the Centralized Fault Display Interface Unit (CFDIU), the printer, the Multipurpose Disk Drive Unit (MDDU) or a Portable Data Loader (PDL) and the Cockpit Voice Recorder (CVR).

INDICATING SYSTEMS

The ATSU sends warning information to the two FWCs on ARINC 429 buses. It receives data that are necessary for AOC application from the FWCs, SDACs and DMCs also on ARINC 429 buses. The ATSU acquires Universal Time Coordinated (UTC) time and date from the clock on an ARINC 429 bus. As back-up of the clock, the MMR2 transmits the UTC time and date from a GPS source, on an ARINC 429 bus.

RECORDING SYSTEMS

The ATSU/FDIMU interface is used for flight performance in uplink request and downlink AIDS reports. The ATSU:
- sends uplink requests to the FDIMU (DMU-part) on an ARINC 429 bus and,
- receives downlink reports from the FDIMU on an ARINC 429 bus.

The ATSU/CFDIU interface is used to transmit the data given below to the CFDIU on an ARINC 429 bus:
- information about internal or detected external failures of the Air Traffic and Information Management System (ATIMS),
- uplink requests.

The ATSU acquires downlink reports and data necessary for AOC application from the CFDIU on an ARINC 429 bus. The ATSU/printer interface is used to print data. The ATSU:
- sends printable data to the printer on an ARINC 429 bus and,
- receives status information from the printer on another ARINC 429 bus.

The ATSU/MDDU interface is used for loading data. The ATSU:
- sends and receives loading data with the MDDU or a PDL through 2 ARINC 429 buses,
- receives status information from the MDDU on a discrete line.

The ATSU/AINS plugs/Laptop (optional) interfaces are used for loading data through ETHERNET buses. The ATSU:
- sends loading data to the laptop by the AINS plugs for documentation consultation modules (FCOM, MEL, FCTM, AFM ...) and/or performance calculation modules (take off, landing, in-flight, weight and balance),
- receives requests from personnel in the cockpit through the laptop connected to the AINS plugs.

The ATSU/CVR interface is used for data recording from the CVR.

NOTE: The AINS plugs are used to connect the Electronic Flight Bag (EFB) for customers who get the Less Paper in Cockpit (LCP) option. LCP application will let the customer replace traditional paper by digital information (Documentation/Performance calculation modules). In a cockpit environment, it is necessary to purchase hardware (usually a laptop) to use the LCP application.

CABIN TERMINAL/ATIMS INTERFACE

The ATSU sends uplink requests to the Digital Interface Unit (DIU) on an ARINC 429 bus and receives downlink reports from the DIU on an ARINC 429 bus.

NOTE: The ATSU/DIU interface is optional.

LANDING GEAR/ATIMS INTERFACE

The ATSU receives, from the Landing Gear Control and Interface Unit (LGCIU), information on a discrete input to determine if the aircraft is on ground or in flight.

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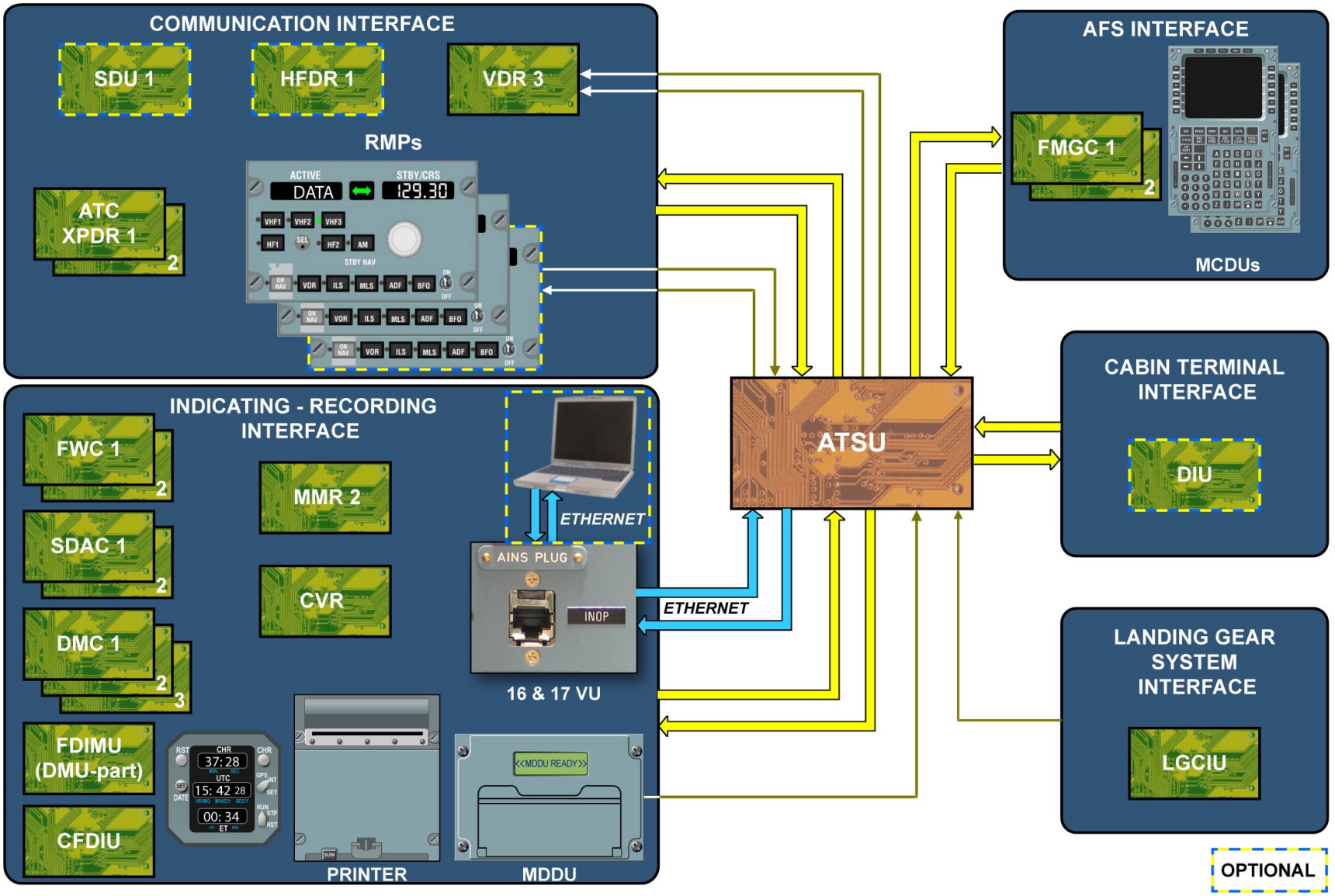

AFS/ATIMS INTERFACE ... LANDING GEAR/ATIMS INTERFACE

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